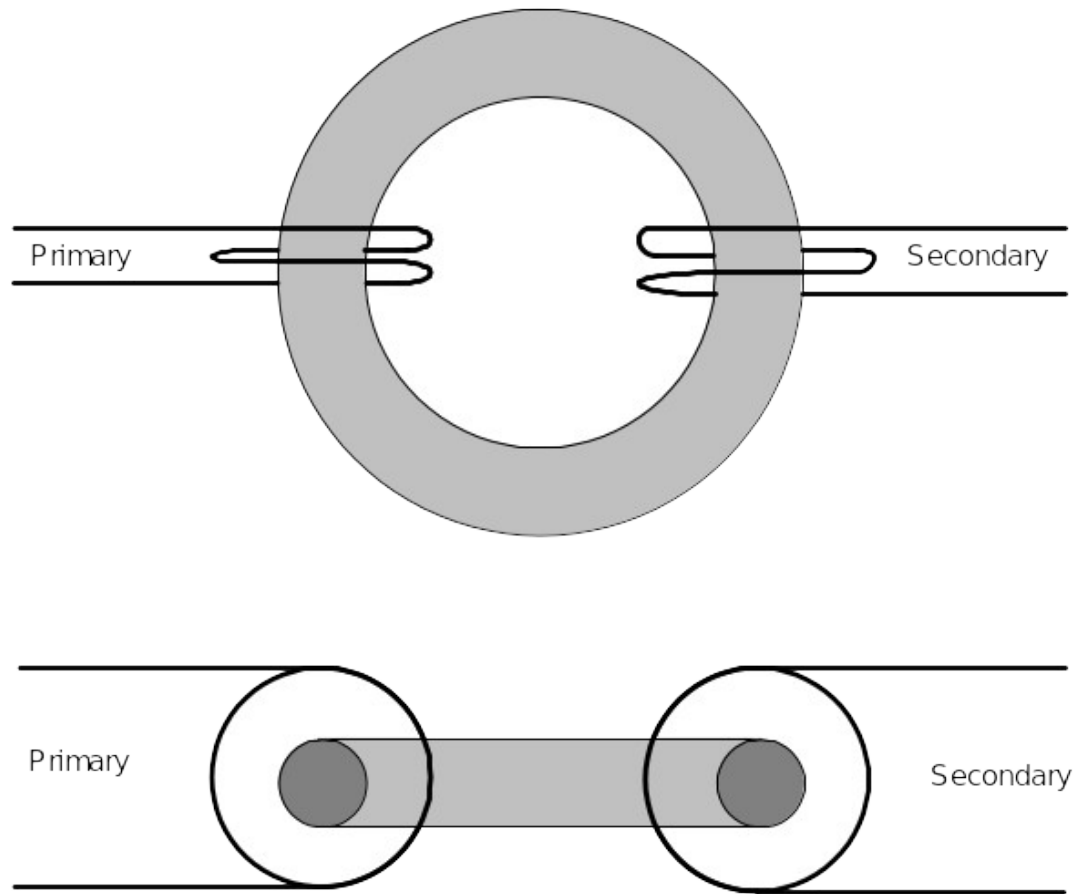


Free Energy Device

Background

A typical transformer is illustrated in the figures below. During normal operation, a sinusoidal voltage is applied across the leads of the primary coil creating a sinusoidal output on the secondary coil. The two coils are wrapped around a magnetic core. As current through the primary coil changes, it creates a changing magnetic field through the core that is routed through the secondary coil. The changing magnetic field through the secondary coil creates a current in the secondary coil. All of this behavior may be derived from Maxwell's electromagnetic equations.

Lenz's law further states that the changing magnetic field through the core will create a back EMF in the primary coil. In other words, the changing current in the primary creates a changing magnetic field in the core that creates a EMF in the primary coil that opposes the original voltage. Similarly, the current in the secondary coil creates a magnetic field in the core that opposes the original magnetic field. These effects cannot occur simultaneously with their causes due to the finite speed of signal transmission. This paper discusses some possible implications of the finite speed of signal transmission with respect to the interaction of a coil (or coil segment) with a magnetic core.



Cross-section of transformer

Basic Concept

If we add a little distance between the coils and the core as illustrated in the figure above, then the oscillating magnetic field generated by the primary is actually transmitted to the core as electromagnetic radiation (albeit of a relatively low frequency for most transformer applications). In fact, any effect that the changing coil current has on the magnet core cannot be instantaneous as all signals have a maximum transmission speed of c (speed of light). Similarly, the effects of the changing core magnetic field on the coil are transmitted from the core to the coil at a maximum speed of c through the medium between the coil and the core.

Now, suppose a sinusoidal voltage (and current) is applied to the coil at frequency, f , and the distance between the coil and the core is such that the time it takes for any signal to go between the coil and core is equal to one-fourth of the period of the sine wave applied to the coil. This means that any round trip signal will experience a 180 degree phase shift (or lag due to delay) compared to a system in which the coil were tightly wound around the core. In such a case, the EMF

imposed on the coil by the changing core magnetic field will be **in phase** with the coil current. It will be a forward EMF, not a reverse EMF. It will enhance the coil current, not retard it.

Testing this concept is problematic. Most transformers don't run at frequencies above 100 KHz. At 100 KHz, a separation of 750 meters would be necessary. This isn't very practical. Further, when applying an AC voltage to the coil, the voltage waveform propagates around the coil at no faster than the speed of light, so the current would not be simultaneously the same around such a huge loop of wire.

Application to History

In developing a means to demonstrate a practical use of this concept, we may consider if this theory can be used to explain the operation of the Moray generator, circa 1920. It has been reported that Dr. T. H. Moray would run long lengths of insulated wire in the air with one end tied to earth ground and the other end tied to a circuit that generated kilowatts of energy without an apparent source of power. It was also noted that Dr. Moray would have to tune his circuit. If the long conductor were acting as the primary coil and some iron ore several miles into the earth were acting as the magnetic core, then the frequency of operation would have to be tuned to correspond to the depth of the iron ore. The frequency of operation would also be a function of the material that was above the iron ore since the speed of EM waves varies with respect to the medium of transmission.

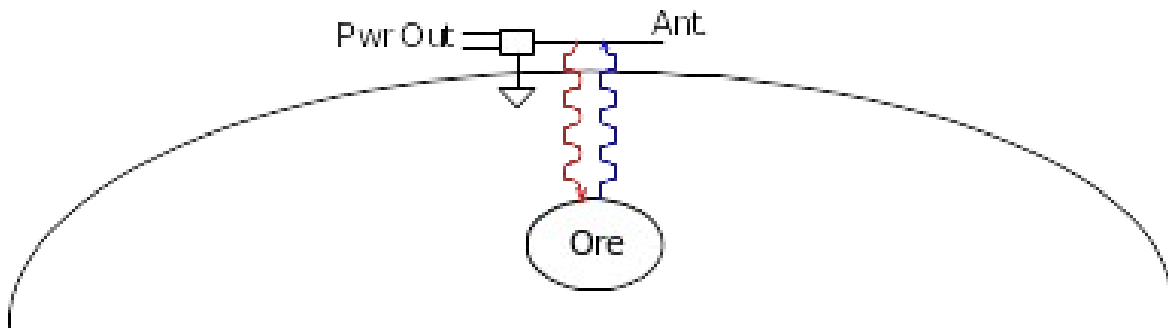
As an example, assume a large deposit of ferro-magnetic ore in the earth is used as the 'transformer' magnetic core. Further assume that the approximate distance from the surface to this deposit is 1.5 km, so even at the speed of light (3×10^5 Km/s), the round trip time for any signal to go to the deposit and a responding signal to return would be:

$$(2 \times 1.5 \text{ km}) / (3 \times 10^5 \text{ Km/s}) = 10 \text{ us.}$$

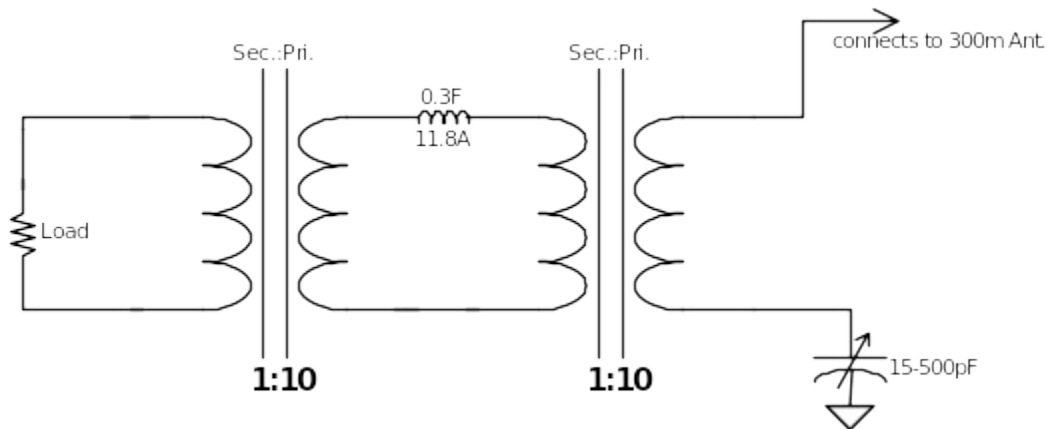
For the returning wave to lag the original wave by 180 degrees, the period of the original wave would have to be 20us. So the frequency of the original wave is 50 KHz. We are making the following assumptions:

- the material of the earth's surface is transparent to these signals
- the ore's magnetic field can oscillate at the selected frequency.

The system is illustrated below.



A schematic representation of the actual system is illustrated below.



The 0.3F inductance is equivalent to a 30H inductance on the antenna side of the transformer due to how impedances transform across transformer windings.

$$L_p = (N_p/N_s)^2 L_s$$

The 0.3F inductance is created by winding 11AWG wire around a ferrite toroid core with the following properties:

- Winding length (l) = 10cm
- Number of turns (N) = 200
- Coil radius (r) = 1cm
- Core relative permeability (μ_r) = 2000
- $L = \mu N^2 A / l$

The 11.8A limit of the inductor is set by the gauge of the wire. This sets the current limit on the antenna circuit to be 1.18A.

Other system characteristics are noted as follows:

- A 14 AWG antenna 300m in length.
- The L-C circuit in series with the antenna will tune-in to a specific resonant frequency and force the circuit to only interact with 'cores' at a specific distance away.
- We will use the standard equations of magnetic fields, coils, and transformers to derive the following results.

The magnetic field in a coil of wire is given by the following equation:

$$B = (\mu)NI,$$

where:

- ' μ ' is the magnetic permeability of the core. The magnetic permeability of iron is about 0.02.
- ' N ' is the number of loops. Our antenna is only a partial loop (we are assuming these equations are applicable to partial loops), so N is a fraction defined as follows: $N = 300m / 2\pi D$ where D is the distance to the ore deposit.
- And ' I ' is the current through the wire.

The EMF imposed on a loop of wire by a changing magnetic field is given by the equation:

$$V = -N A dB/dt$$

where:

- ' N ' is the same number of loops as derived above.
- ' A ' is the cross-sectional area of the magnetic core.

Substituting $B = (\mu)NI$:

$$V = -N^2 A (\mu) dI/dt$$

This is where it gets complicated because we see that the voltage increases with increasing current, but the current increases with increasing voltage. But these two elements are not simultaneous. The dI/dt is from the previous half cycle.

We will start our calculations based upon the value of the capacitor which is the only variable that we can change in the system. For a capacitance of C, the resonant frequency of operation is determined by:

$$f = 2\pi (LC)^{-1/2}$$

The maximum charge that is placed on the capacitor is given by the following equation:

$$Q = CV_{\max}$$

Where C is the capacitance and V is the applied voltage.

The maximum current is approximated to be equal to the maximum charge divided by the time it takes to discharge the capacitor. This time is one-fourth the period of the oscillation or $1/(4f)$.

$$\begin{aligned} I_{\max} &= CV_{\max}(4f) \\ I_{\max} &= CV_{\max}(8\pi (LC)^{-1/2}) \\ I_{\max} &= 4.59V_{\max}C^{1/2} \end{aligned}$$

As previously stated, the current limit on the antenna circuit for this particular system is 1.18A. So:

$$\begin{aligned} 1.18 &= 4.59VC^{1/2} \\ 0.257 &= (VC^{1/2})_{\max} \end{aligned}$$

This establishes the maximum operating capacitor voltages for various values of capacitance as listed in the following table.

Capacitance (pF)	Max Voltage
10	812,705
50	36,345
100	25,700
200	18,172
300	14,837
400	12,850
500	11,493

The current through the antenna circuit changes from its maximum value to its minimum value (0) in the same period of time: $1/(4f)$. We

may, therefore, give the following as an approximation for the maximum value of dI/dt :

$$(dI/dt)_{\max} = CV_{\max}(4f)^2$$

Using the fixed value of inductance of 30H, we may further derive:

$$(dI/dt)_{\max} = 21V_{\max}$$

The distance to the magnetic ore is also established by the frequency of operation if we assume the signals travel at approximately the speed of light or $3 \times 10^5 \text{ km/s}$.

$$D = 3 \times 10^5 / (4f)$$

From this, we derive our fractional loop as follows:

$$\begin{aligned} N &= 0.3 \text{ km} / 2\pi D \\ N &= 0.3(4f) / (2\pi(3 \times 10^5)) \\ N &= (6.37 \times 10^{-7})f \\ N &= (7.3 \times 10^{-7})C^{-1/2} \end{aligned}$$

The forward EMF applied by the returning signal is:

$$V = N^2 A (\mu) dI/dt$$

Or:

$$V_2 = ((53.3 \times 10^{-14})/C)A(0.02)(21V_1)$$

Where we distinguish between the voltage applied to the capacitor on the first half cycle (V_1) and the EMF applied to the antenna on the following half cycle (V_2).

Further multiplying this out:

$$V_2 = (22.4 \times 10^{-14})V_1 A/C$$

We know that our capacitance is in units of pF which has a multiplier of 10^{-12} , so we can insert this multiplier and refer to our capacitance in pF instead of Farads.

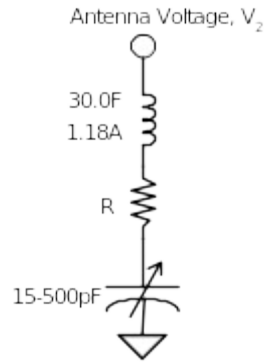
$$V_2 = (0.224)V_1 A/C$$

This equation states that the next half cycle voltage can be equal or greater to the previous half cycle voltage if the cross-sectional area of the magnetic ore (in m^2) is greater than 4 times the capacitance in pico-farads.

So, if the system tunes in to a buried ore deposit when the capacitor is set at Y pF, the system will generate free energy as long as the cross-sectional area of the buried ore is equal to or greater than $4Y \text{ m}^2$.

This is very encouraging as it does not require unrealistically large deposits of ore for the system to work.

We will now consider the effect of the load, R , on the system. The resistive load also transforms as $(N_p/N_s)^2$ from the secondary to the primary circuit. This load is in series with the antenna, inductor, and capacitor. The equivalent circuit is illustrated as follows:



We have been assuming all along that the circuit operates that the resonant frequency of the effective inductance and capacitance, so $Z = R$.

We can now use R to establish $I_{\max}$ and $dI/Dt)_{\max}$. R also has a maximum limit over which it will limit the ability of the capacitor to charge at a particular frequency. This RC time constant should be 10 times less than the discharge time of (period/4). So, $RC < 2.5/f$, or $R < 2.5/(fC)$

Plugging in $f = 2\pi (LC)^{-1/2}$:

$$R < 2.5/(2\pi (C/L)^{-1/2})$$

$$R < 0.4 (L/C)^{1/2}$$

Assuming a fixed value of 30H for L , yields:

$$R < 2.3 C^{-1/2}$$

Some maximum values of R are listed in the following table.

C (pF)	R (KΩ)
15	594
50	325
100	230
200	163
300	133
400	115
500	102

So, for $C = 100\text{pF}$, we can safely have $R = 23,000\Omega$. To have $I_{\max}$ at 1A, $V_{\max}$ would be 23KV. On the first secondary circuit, this would be represented with a 230Ω resistor, a 2300V voltage and a 10A current. This results in a maximum power of 23KW.

In order to maintain the 23KV on the next cycle, the cross-sectional area of the ferro-magnetic deposit would have to be 450m². Other properties of the system are listed as follows:

- Frequency of operation = 114,656Hz
- Distance to ore = 0.654Km
- N = 0.073

These values can be quickly manipulated using an Excel spreadsheet.

Test Setup and Prototype

The initial prototype system will be comprised of the following elements:

- 1) Ocean State Electronics BC14400 15-500 pF variable capacitor. Three sections can be connected together to create 45pF-1500pF variable capacitor.
- 2) I will use ferrite toroid cores (as large as possible) to wind my own 0.3H inductor and 10:1 transformers.
- 3) I will use a DC-DC HV power supply to prime the capacitor with 10KV, then switch out the power supply and switch in the antenna circuit.
- 4) Several extension cords connected together will create the 300m antenna.
- 5) High wattage flood lights will comprise the initial test load.

Risks

- 1) It has been unusually difficult to purchase ferrite toroid cores larger than 3" in diameter.
- 2) I have no experience in transformer design. The material selection, size, number of turns, and operating current are all critical to optimum (or even proper) operation, and I am counting on getting lucky and having it just work.
- 3) It has been unusually difficult to procure a 10KV DC power supply. The vendor's websites do not allow me to just purchase one over the web. I have to call. How odd.
- 4) If the antenna has very high voltages as predicted by my calculations, I may not be able to just lay the insulated extension cords down on the ground. It would be a real pain to suspend the antenna for 300 meters.
- 5) If the antenna really has such high voltages and high power, then it would create a real physical hazard. I have to make sure no one gets hurt.
- 6) I am assuming that the signals can propagate through the earth without being significantly attenuated; although there appears to be enough margin to accommodate moderate levels of attenuation.

- 7) I am assuming the ferro-magnetic ore can oscillate at the required resonant frequencies.